

## ONE TECHNICAL SOLUTION OF THE UNIFIED COMMUNICATIONS SYSTEM IN THE HOTEL ENVIRONMENT

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**Abstract:** *Modern hotel organizations invest significant funds to increase quality of service. It is necessary to provide as much comfort as possible to both hotel guests and employees, which includes access to various multimedia services (Internet, VoD, IPTV service, etc.). Unified communications in hotel environment offer a quality solution to the problem of communication across hotel and contribute to the improvement of hotel services, as well as creating a good image. Unified Communications is a collection of applications and devices of the latest generation that allow users to dimension, control and manage calls, messages, data, and software tools from any location, using any device or software interface. Thanks to the diversity in the domain of information exchange, Unified Communications are applicable in almost all types of business environments.*

*The realized technical solution contains the Unify system of the OpenScope Business series as one of the most modern forms of TDM/IP hybrid solutions. The system offers a simple installation, maintenance and upgrade with minimal energy consumption compared to other systems. The problem of transferring multimedia real time signals through the IP network is solved by QoS mechanisms. The project envisages Firewall protection of the internal network on the Juniper Router page, which has all the necessary facilities to connect the hotel to the Internet. The technical solution also envisages the installation of SIP GSM gateway type 2N at a central location, with the possibility of up to 4 SIM cards, for calls to employees on mobile networks, which is considered an optimal solution for the needs of hotels with up to 50 employees.*

*Hotel environment is specific for several reasons. The network structure is, in most cases, subdivided into sub-networks for guests and employees. The functionality of the devices differs, and in each service it is enough to provide only a certain set of functions in order to provide guests with a fast and efficient service. The subnet for the guests is made up of the terminal devices brought by the guests and the terminal equipment owned by hotel. The terminal devices communicate over the Wi-Fi access point in the 2.4 or 5GHz band according to the IEEE 802.11b/g/n and 802.11ac standard with a dual-mode operation. IPTV platform provides high-quality IPTV service, but also delivers various additional information that the hotel wants to offer to its guests. The displays enable integration with smartphones and with the rest of the Hotel Systems. The technical solution also includes the installation of Headend having required capacity for receiving a television signal, as well as the installation of wireless telephony servers via DECT technology.*

*Unified communications system in hotel environment has a low maintenance cost, and provides customization to individual customer needs, portable services on every device, and the inclusion of new services that generates additional revenue. The implemented Unified Communications*

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*System optimizes and accelerates the process of information exchange within the hotel organization.*

**Keywords:** *Unified Communications, Hotel Systems, multimedia services, network solution*

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## 1. INTRODUCTION

Business process optimization and quality enhancement are among the most important tasks of an enterprise and are correlated with maximizing profits [1]. In the service sector, the communication of employees with the service users, as well as communication between employees themselves, has a significant impact on business optimization [2]. Unified Communications Systems offer different technological solutions that together contribute significantly to the quality of service [3]. Implementation of solutions that enable business process optimization depends on user requirements, specific goals that a user wants to achieve by implementing the solution and on the budget the hotel has [4]. The hotel environment, in addition to the attractive hotel location, kindness and quick response of staff, should also provide maximum comfort for service users who are increasingly expecting easy and reliable access to high-speed Internet, as well as to other modern services. Hotel organizations are making great efforts to meet the customer's wishes and keep or create a good image. Continuous work on image enhancement is the mission of any hotel organization, as it is one of the key factors in deciding where to stay and whether to return. A good image is very difficult to obtain and is easily lost, so hotel managers often insist on monitoring and increasing the quality of services [5]. Unified communications in the hotel environment provide modern ways of exchanging information and incorporating new services into the existing offer. High-quality communication and automation of processes carried out within the hotel enable more efficient operation and thus lead to optimization [6].

This paper presents a technical solution for improving the hotel environment, increasing the quality and optimizing the business process. The functional advantages and technological advances that the unified communications system brings to the hotel environment after practical implementation are described.

## 2. SIGNIFICANCE OF UNIFIED COMMUNICATION

Unified communications combine the latest generation of applications and devices that enable mobility, adaptability to different user devices or software interfaces, as well as control and management capabilities [7]. Unified communication provides synchronous work of applications and software tools and optimizes business communication and positively affects the productivity. Successful realization of the Unified Communications system in the hotel environment requires, above all, precise planning, dimensioning and preparation. In addition to the standard set of functions that the solution needs to provide, the successful implementation of the solution implies the readiness to upgrade, expand and adapt to the new tendencies in the hotel market in the future.

Communication platforms increasingly resemble one another, so e-mail platforms often include the ability to establish voice communication (e.g. Microsoft Outlook - Lync), chat is available on Public VoIP services (Skype), and social networks have integrated capabilities of chat and/or voice communication (Facebook) [8]. The main idea behind the Unified Communications is that users are accessing a number of advanced communications technologies from one place or

one device - connecting people with information and with other people, which is of increasing importance in the hotel environment. Optimum and efficient communication helps timely decision-making, allowing hotels to accelerate business [9]. The user has the ability to establish communication with one medium and to continue using the other one, if they choose so [10]. The user of Unified Communications Service can respond to an incoming phone call, for example, via an application installed on Android/iOS device or by redirecting the caller automatically from the application to voicemail or fixed phone, etc.

The flexible licensing structure of modern Unified Communications systems enables easy upgrading and adaptation to user needs. Hardware or software solutions are designed to easily connect to related systems over standard networking interfaces. The license structure is often subdivided into licenses that relate to the general functioning of the Unified Communications System - that type of licenses are either primary or system licenses on the one hand, and on the other hand, licenses concerning the individual requirements of the users of the telephone devices and these licenses are optional. Thanks to the versatility of the solution, the user can choose to use applications on a computer, Android / iOS mobile device, on a TV or on a fixed telephone device. The client can make a decision about extending the functionality immediately or when the need arises or when the funds are provided. The technical solution should enable a simple upgrade of existing services such as extending the functions of the communication solution by adding licenses from the software side and additional modules from the hardware side.

### **3. HOTEL REQUIREMENTS**

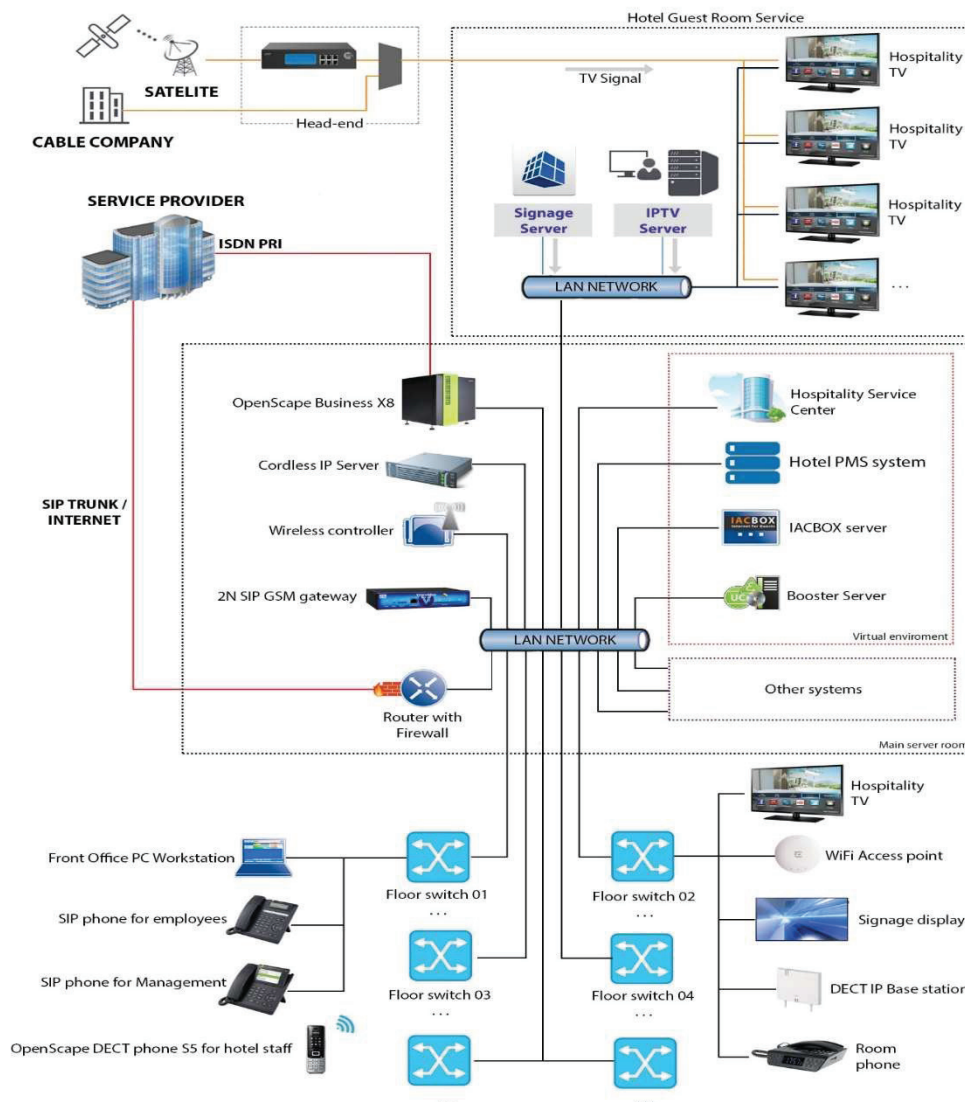
When determining which technical solution is most appropriate for a hotel organization, the organizational structure of the hotel can be a significant element, and that structure can be very diverse. Dimensioning of the technical solution will depend primarily on the size of the hotel organization, but also on the number of restaurants, bars, conference room size, specificity of additional space such as fair halls, casinos, congress halls, etc. Hotels are typically ranked in size as small, medium and large, according to the number of available rooms. In Serbia, hotels / motels that have between ten and fifty rooms are usually referred to as small hotels, between 50 and 200 as middle ones, and with more than 200 rooms as large hotels. There are also universal organizational segments in each hotel. These are departments like Room Division, Administration, and Repair & Maintenance. These departments can be seen in a hotel of any size, and a technological solution that enhances their functioning and interaction is needed.

As stated, the number of hotel rooms is one of the most important items when dimensioning the solution. The rooms are the basic hotel service, and accordingly, the units that are mounted in the rooms are chosen with utmost care and precision to fully fit into the room and make the guest feel comfortable as in their own home. One of the most important needs of hotel organizations when it comes to rooms is the need for a quick and accurate exchange of information between employees for the efficient maintenance of these rooms. Information such as: which room is neat and ready to receive the guest and which is not; in which room the mini bar should be filled up; in which room is missing a towel; in which room a shelf is broken and so on are vital information for efficient operation and maintenance. The technical solution is designed so that it speeds up and simplifies the exchange of information [11].

#### 4. TECHNICAL SOLUTION

The technical solution of the Unified Communications System (Figure 1) has been implemented by the Unified OpenScope Business system, which has sufficient capacity to cover the needs of small and medium-sized hotels of 500 users per node and up to 2,000 users in the network if additional remote locations are used [12].

Figure 1: Block scheme of technical solution



ISDN PRI and SIP trunk lines are delivered to the site to provide the required capacity of outgoing / incoming phone traffic for serving employees and hotel guests. Providing both types of technology enables practical survivability at the level of the transmission line. Users at their request can communicate internally with all the required functions, regardless of whether some

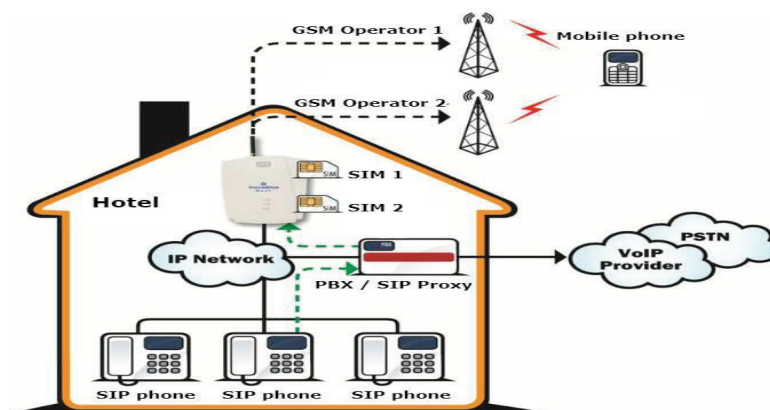
of the trunk services are available. The hotel is connected to the Public Network via Telecom ISDN PRI of 30 channels and additionally via a 15-channel SIP trunk backup. The Internet connection provides 100/100 Mbps download / upload capacity, which guarantees the realization of the necessary traffic generated from and to the Internet.

The technical solution includes the installation of Headend that has the required capacity for receiving a television signal, as well as installing a wireless telephony server via DECT technology. The number of simultaneous outgoing and incoming calls is adjusted to the real needs of the hotel, and in practice it is estimated at 10% on the total number of rooms / telephones. Thanks to an additional SIP trunk that also provides redundancy at the link level, additional channels / simultaneous calls are also provided through this type of trunk. The SIP trunking service provider is selected on the basis of the information on the lists provided by the equipment manufacturers [13]. The installation is set up from the server room, through the concentrator on the floors to the hotel rooms, and to the location of the devices. Category 5 cables are used, with category 6 recommendation, given the need for IP technology transfer.

Firewall also provides internal network protection over a device that has the ability to work in the High Availability mode. Juniper Firewall provides secure internet access, as well as secure and reliable remote network access through IPsec encryption and tunnel. It can support up to 2000 IPsec VPN tunnels. It supports OSPF and BGP dynamic routing.

SIP GSM Gateway enables the connection of employees to mobile networks (figure 2.). Since there are various types of devices that access the network (analog / digital / SIP phones, FAX devices, etc.), there is adequate translation of the format in accordance with the end-user access technology. QoS mechanisms solve the problem of sending voice signals and other types of traffic over IP networks.

Figure 2: SIP GSM gateway role



Front office functionality is implemented through the selected PMS system. Given that the PMS system is the central point for reception staff, the proper integration of other systems on the PMS is mandatory since the systems must be automatically adjusted to the check in / checkout of the hotel staff. Proper integration enables timely updating of room status information. For example, whether a certain room is clean and ready for the guest, i.e. what needs to be remedied in the room so that it becomes available again for the guest to enter.

The system can be configured with up to 16 different administrator orders via WBM - web-based management (figure 3.). Each administrator is assigned a profile that specifies the scope of authority. The system administrators access the system via the https connection using the standard Browser that is located in the integrated or later installed version of the application on Windows or Linux operating systems.

Figure 3: Management OpenScape Business X8

The screenshot displays the OpenScape Business Assistant management interface. The top navigation bar includes the UNIFY logo and the text 'Harmonize your enterprise'. The main content area is divided into several sections:

- System:** IP Address: 172.16.22.11, System Date: 19/05/14 14:49, System Up Date: 19/05/14 11:30. This system is the MASTER node. Nodid: 1, Sync. Status: 1 Data in sync. A red message states: 'No backup set was ever created.'
- Licensing:** Locking ID: NKCNDNXFTKAKHWHYJN.23P9, SIEL ID: SID:1321888881931, MAC ID: NKCNDNXFTKAKHWHYJN.23P9. System is in regular license state.
- Inventory:** Active User: 4, IP Clients: 0, Deskshare User: 0, Mobility: 0.
- Applications:** Application Launcher: 172.16.22.11, CSTA Connector: 192.168.1.3, OpenDirectory Service: 192.168.1.3, UC Suite / XMPP: 172.16.22.11, Gate View: 192.168.1.3, Web Collaboration: \*ICustom Server.
- Documents:** The documentation for your system can be found here...
- Software:** SW Version: osbiz\_v1\_R3.0.0\_427.

## 5. CONCLUSION

Described System of Unified Communications provides a highly scalable and flexible technical solution that enables a wide range of applications. The OpenScape Business solution architecture can be completely independent of existing telephony infrastructure - traditional telephony, IP or DECT voice technology. Wi-Fi and DECT phones still have the advantage over Android/iOS applications that work on the Best effort principle without quality assurance. The IPTV solution enables the realization of smart rooms and the connection of other fixed and mobile devices. The described technical solution provides a more quality automation of business processes, simplifies the communication of employees with each other and with guests, offers new revenues-generated services and represents the all-in-one solution of a modern hotel communications network. The next step in applying contemporary Unified Communications in hotel rooms will be the implementation of smart rooms, where the systems will be completely integrated into one.

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